*Recover**EDGE***™ supports host adapter switching during disaster recovery on Xinuos SCO OpenServer 5.0.5-5.0.7/5.0.7V.

RecoverEDGE BTLD Support

*Backup**EDGE*** 01.01.08 Build 6 and later
*Recover**EDGE*** 02.01.07 and later

This document is needed for proper use of BTLDs during bare metal disaster recovery, and should be kept near the *Recover**EDGE*** media. A copy is also posted for reference on the Microlite Corporation web site:

http://www.microlite.com

Introduction

BTLDs (**B**oot-**T**ime **L**oadable **D**rivers) allow a user to switch SCSI host adapters during a crash recovery. This is especially important for systems for which the host adapter being used before a system crash is no longer available.

Note that if you are switching host adapters as part of a planned upgrade, it is faster and easier to build a kernel with the proper host adapter driver and place it on your *Recover**EDGE*** media than it is to use a BTLD. And there are caveats to using BTLDs which will be explained later in this document.

Theory of Operation

OpenServer 5 generally requires all drivers for a particular device to be linked into the kernel (**`/unix`**) before the device will operate. Most important for disaster recovery are the adapters that control the hard drives and the storage devices.

The best kernel to use with *Recover**EDGE*** is generally the current system kernel, which contains drivers for all the currently used storage devices, plus drivers for networking and modem support.

Installation kernels and “safe” kernels generally do not support multiple host adapters, and networking, which make them unsuitable for disaster recovery on anything but a basic system.

*Recover**EDGE*** with BTLD support allows you to use your current system kernel, with all of its device drivers, for local or remote crash recovery, plus switch hosts adapters if necessary.

What are the Caveats?

The traditional way of supporting BTLDs on crash recovery media was simply to place an un-stripped system or install kernel on the boot media, along with the “link” program.

There are many disadvantages here...

- *Recover**EDGE*** supports network disaster recovery, and recovery on systems with host adapters. These can’t be done with the install kernel.

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- Un-stripped kernels, plus the link program, might not fit on the boot media (floppies are limited in size, and other boot media types use floppy emulation mode under OpenServer 5).
- Basic installs, with no networking or other enhancements, work reasonably well using the traditional method. However, adding almost any device drivers creates a kernel symbol table which is far too large for the memory constraints of the **/boot** program when it is trying to load the symbol tables necessary to link in a BTLD during the boot process.
- The user could easily create media which would be fine during a normal crash recovery, but would fail to load the full symbol table if you attempted to use the "link" command to load a BTLD. Worse yet, the kernel symbol table might load, but after inserting the BTLD diskette and starting to load the driver, the symbol table would fill at this point, and you'd still be out of luck, and not know it until it is entirely too late.

Every system in use at Microlite failed to load a BTLD when the traditional methods were employed, and so we looked for a more reliable solution.

*Recover**EDGE*** employs new techniques to...

- allow BTLD support to work with your standard system kernel, preserving multiple host adapter, hard drive and network support.
- save space on the boot media.
- greatly improve the probability that BTLDs will load properly when needed.

On very large systems, the necessary tools may still not fit on the boot media, in which case *Recover**EDGE*** will ask you to disable BTLD support and try again.

Some systems may still fail to load the symbol table when the link command is used. However, the number of systems where a BTLD will not be loadable when needed will be dramatically reduced compared to boot media where the traditional method is employed.

Making RecoverEDGE Diskettes

As documented in the manual, you may log in as **root** and type...

re2

or you may run **edgemenu** and select...

Setup[1] **-> Make RecoverEDGE Media**

The default media creation mode for *Recover**EDGE*** is to attempt to create boot media with BTLD support enabled. If the enhanced kernel still will not fit on the boot media, a warning message will be issued. You will be asked to go into the **Configure** sub-menu, disable BTLD support, and try again. This will create standard diskettes without BTLD support, and much larger kernels will fit.

Testing Boot Media (Normal)

As described in the manual, we ALWAYS recommend testing the boot media after making them to be sure they will work when you need them.

1. Under older releases, try "Admin -> Make RecoverEDGE Media".

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When the system can be safely brought down, boot from the media into the main menu.

Select **Utilities -> Archive Utilities -> Test Archive Media** and read from the backup for a few minutes, just to make sure everything is OK.

If you plan on doing remote crash recovery, enable modem or network support and use another machine to dial or telnet in and test this capability. List files from a remote backup if that feature will be used.

Constructing Boot Strings

Whenever you are booting and need to use a BTLD, you must tell the boot command...

- the directory name of the BTLD on the BTLD diskette.
- the actual BTLD driver name.
- The devices (typically hard drives and tape drive) that are attached to the host adapter controlled by the BTLD driver.

This is done by constructing a boot command listing the appropriate directives. Consider the following command syntax:

```
defbootstr link=XXXXX Sdsk=YYYYY(0,[0,]0,0) Stp=YYYYY(0,[0,]0,0)
                  |          |   |  |  | |
      Btld Name---+          |   |  |  | +--Lun Number
                             |   |  |  +----SCSI ID
    Actual Driver Name-------+   |  +-------Optional Bus Number
                                 +----------Drive Number
```

where **defbootstr** means to use the current default boot string, **XXXXX** is the on-disk directory name of the BTLD you are trying to load, **YYYYY** is the actual driver to be installed, and the **zeros** should be replaced with appropriate values for your hardware configuration (at minimum the SCSI ID for the tape drive (**Stp**) must be different from the SCSI ID for the hard drive (**Sdsk**)).

Bus numbers are rarely used, so they can usually be ignored, leaving...

```
defbootstr link=XXXXX Sdsk=YYYYY(0,0,0) Stp=YYYYY(0,0,0)
                  |          |   | | |
    Btld Name-----+          |   | | +--Lun Number
                             |   | +----SCSI ID
  Actual Driver Name---------+   +------Drive Number
```

The on-disk directory name (**Btld Name**) and the **Actual Driver Name** are **usually** identical. This is true for all drivers downloaded from the Xinuos web site.

However, the Adaptec web site has BTLD diskettes with drivers for multiple operating systems on them. On their latest driver diskette, the OpenServer 5 driver is located in the **blad325** directory, while the driver itself is called **blad**. In this special case, **XXXXX** would be **blad325**, while **YYYYY** would be **blad**.

As an example, suppose we wanted to construct a command to link the Adaptec 29160 driver (**ad160**) from the driver diskette image on the Xinuos ftp site, with the primary hard disk on SCSI ID **0** and the tape drive on SCSI ID **2**. In this instance the disk name and the driver name are identical, so the command would look like this...

```
defbootstr link=ad160 Sdsk=ad160(0,0,0) Stp=ad160(0,2,0)
```

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Remember, you have to identify each device you intend to use during a BTLD recovery. After the recovery is complete and you want to permanently install the BTLD driver, you can boot into single user mode specifying only the **link** command and root hard drive (**Sdsk**).

This example would be used with the BTLD diskette from the Adaptec web site to load the **alad** driver.

```
defbootstr link=alad325 Sdsk=alad(0,0,0) Stp=alad(0,2,0)
```

You may substitute **network** or **modem** for **defbootstr** in any of the above if you want to automatically initialize network or modem support upon boot. These may also be initialized after the *Recover**EDGE*** menu appears.

Testing Boot Media (BTLD)

You should always test a set of BTLD-enabled media to be sure that drivers can be linked into them if necessary. BTLDs shouldn't be trusted unless this test completes successfully. This test must be performed **IN ADDITION TO** the tests described in "**Testing Boot Media (Normal)**" above.

Obtain a BTLD diskette with an **mdac**, **blad**, **ad160** or any other device driver.

Boot from the *Recover**EDGE*** **Boot Media**. At the...

```
Boot
:
```

prompt, type an appropriate boot/link command as described in the previous section...

The kernel will load and you will be prompted to insert the BTLD diskette at the appropriate time.

If you get all the way to the...

```
Please Insert Your RecoverEDGE Filesystem Diskette and Press [Enter]
```

prompt, **without** getting a **"driver_name" not loaded** message, your BTLD support is working properly. You may power off, remove the diskettes, and re-boot under the hard drive at this time.

Using The RecoverEDGE Diskettes

If you are in a crash recovery situation and do NOT need to use BTLDs, simply follow the normal procedure outlined in your *Recover**EDGE*** manual. If you have changed host adapters, follow the instructions listed in the previous section to boot and load the correct host adapter driver.

When all *Recover**EDGE*** media have been loaded prompted, proceed to the main menu, and continue your crash recovery.

When you have finished restoring, remember that the kernel on the hard drive does NOT have a device driver for the host adapter you've used. Follow the procedures in the next section to boot into single user mode and permanently link the BTLD driver into the boot kernel.

Installing The Driver Into The Boot Kernel

Now that you've done a crash recovery, you need to link the driver into the boot kernel. Here is the procedure:

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Boot again from the *Recover**EDGE*** **Boot Media** (not from the hard drive). At the...

```
Boot
:
```

prompt, type...

```
boothd link=ad160 Sdsk=ad160(0,0,0)
```

replacing the **ad160** references above with the name of the BTLD disk name and driver name that you used previously, and **0,0,0** with the appropriate root hard drive information (**0,0,0** is usually correct).

This will load the **/stand/unix.re.Z** kernel from your hard drive and prompt you for the BTLD diskette when needed.

If for any reason the **unix.re.Z** file was removed or doesn't load, instead type...

```
bootfd link=ad160 Sdsk=ad160(0,0,0)
```

making the appropriate replacements. This will load the kernel from the floppy, which is slower but accomplishes the same thing.

You MUST type the **root** password at the [**Ctrl-D**] prompt and go into single user mode,

At the command prompt:

Mount the BTLD floppy diskette...

```
mount -r /dev/fd0135ds18 /mnt
```

Run the BTLD installer...

```
btldinstall /mnt
```

The floppy will be read and a list of available drivers that can be installed will be displayed.

```
-------------------------------------------------------------
 The following packages are on this diskette:
  NAME            DESCRIPTION
  (List of package Names Displayed)

  Please enter the names of the packages you
  wish to install, or q to quit:
-------------------------------------------------------------
```

At this point, enter the name of the package (Driver) you used previously.

After the driver has been installed you will see...

```
Do you want to make the (Driver) adapter your default boot adapter?
Answer "yes" if you want to boot from the (Driver)
Answer "no " if you want to boot from another adapter such as the
AHA-1542, AHA-2742T or any other type of adapter.
(y/n) _
```

Answer **yes** (**y**).

You'll get the following message, followed by a **boot** prompt...

```
File /etc/conf/cf.d/mscsi has been modified to boot from (Driver}
Note: A new kernel must be built for the changes to take effect.
Installed (Driver)
```

Before building the new kernel, check the file **/etc/conf/cf.d/mscsi**.

Make sure you change **all** of the devices reflect the correct host adapter driver.

You may optionally turn off the old SCSI driver to save space in the kernel. Do this by editing **/etc/conf/sdevice.d/XXXX**, where **XXXX** is the old driver name. For example **/etc/conf/sdevice.d/alad**. Change field **2** in each line from a **Y** to an **N**. This will disable the driver in subsequent kernel builds.

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Then rebuild the kernel with...

```
cd /etc/conf/cf.d
./link_unix
```

Answer **yes** (**y**) when you are asked...

```
The UNIX Kernel has been rebuilt.
Do you want this kernel to boot by default? (y/n)
```

Unmount the floppy diskette by typing...

```
cd /
umount /mnt
```

Then shut down and reboot. The system should be fully functional with the new host adapter driver.

The Final Step

After a successful BTLD-based crash recovery and driver install, always remember to re-create and re-test your *Recover**EDGE*** diskettes to reflect your current system configuration.

Additional BTLD Information

From the Xinuos ftp dowloads at
ftp://ftp.xinuos.com/pub/openserver5/507/drivers

link=aacraid Sdsk/ Stp=aacraid	Adaptec and OEM RAID Adapters
link=ad320 Sdsk/Stp=ad320	Adaptec 29320/39230
link=amird Sdsk/Stp=amird	LSI and OEM MegaRAID
link=blc Sdsk/Stp=blc	BusLogic VMWare Driver
link=iir Sdsk/Stp=iir	Intel Integrated RAID ICP/Vortex RAID
link=lsil Sdsk/Stp=lsil	LSI Logic Non-RAID 53CX
link=percraid Sdsk/Stp=per-craid	Dell PERC RAID
link=slha Sdsk/Stp=slha	LSI Legacy (Symbios 53CX)

From the Hewlet Packard ProLiant Extended Feature Supplement 5.790a
http://www.hp.com

link=hpsas Sdsk/Stp=hpsas	HP Serial Attached SCSI (SAS) Host Adapters

From the OpenServer BTLD diskette at
ftp://ftp.xinuos.com/pub/drivers/OSR506/btld/ad160/ad160.btld

link=ad160 Sdsk/Stp=ad160	Adaptec Ultra160 Family Driver

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From the OpenServer BTLD diskette at
ftp://ftp.xinuos.com/pub/drivers/OSR505/btld/btld.img

link=alad Sdsk/Stp=alad	Adaptec 294x 394x 494x
link=blad Sdsk/Stp=blad	Adaptec 2940U2W 3950U2
link=mdac Sdsk/Stp=mdac	Mylex Disk Array Controller
link=ncr Sdsk/Stp=ncr	NCR Microchannel Systems
link=slha Sdsk/Stp=slha	Symbios 53c8xx

From the OpenServer BTLD diskette at
ftp://ftp.xinuos.com/pub/drivers/OSR505/btld/ad160/ad160.btld

link=ad160 Sdsk/Stp=ad160	Adaptec Ultra160 Family Driver

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